

# ACEX2022

---

15<sup>th</sup> International Conference on Advanced Computational Engineering and Experimenting,  
Florence, from 3-7 July 2022

## **Synthesis of Metamaterials: New Experimental, Numerical and Theoretical Challenges**

The problem of synthesis of given metamaterials consists in the search of the micro-structure that shows, at a certain macro-level, the behaviour specified by a certain given kinematics and a specific action functionals. In a sense this is an inverse problem: while usually one has a given physical system and seeks for the correct mathematical model to describe it, in the synthesis problem one gives the mathematical model and seeks for a physical system that is described by it.

Recent advances of the technology of 3D printers allow for the construction of architected materials having complex micro-structures.

Therefore, the problem of the synthesis of tailored metamaterials has now an immediate range of technological applicability. In this lecture it is presented a resumé of solutions obtained in the last decade to the problem of the synthesis of generalised continua and include the presentation of pantographic microstructures. This is a specific class of microstructure whose study required the development of novel mathematical, experimental and numerical tools and that promises to be important in the problem of the synthesis of a large class of generalised continua.